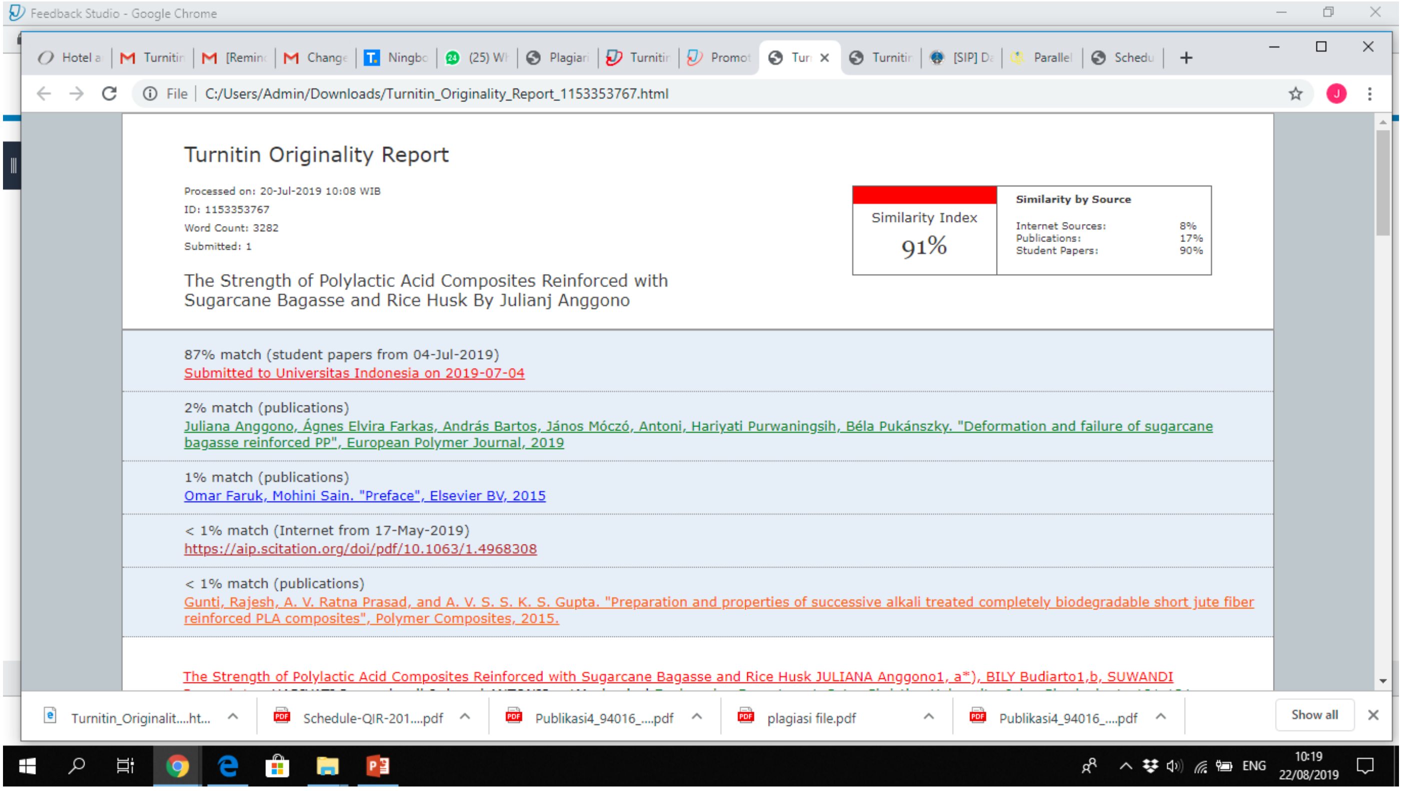


Turnitin Originality Report

Processed on: 20-Jul-2019 10:08 WIB
ID: 1153353767
Word Count: 3282
Submitted: 1

The Strength of Polylactic Acid Composites Reinforced with Sugarcane Bagasse and Rice Husk By Julianj Anggono

Similarity Index	Similarity by Source	
91%	Internet Sources:	8%
	Publications:	17%
	Student Papers:	90%

87% match (student papers from 04-Jul-2019)
Submitted to Universitas Indonesia on 2019-07-04

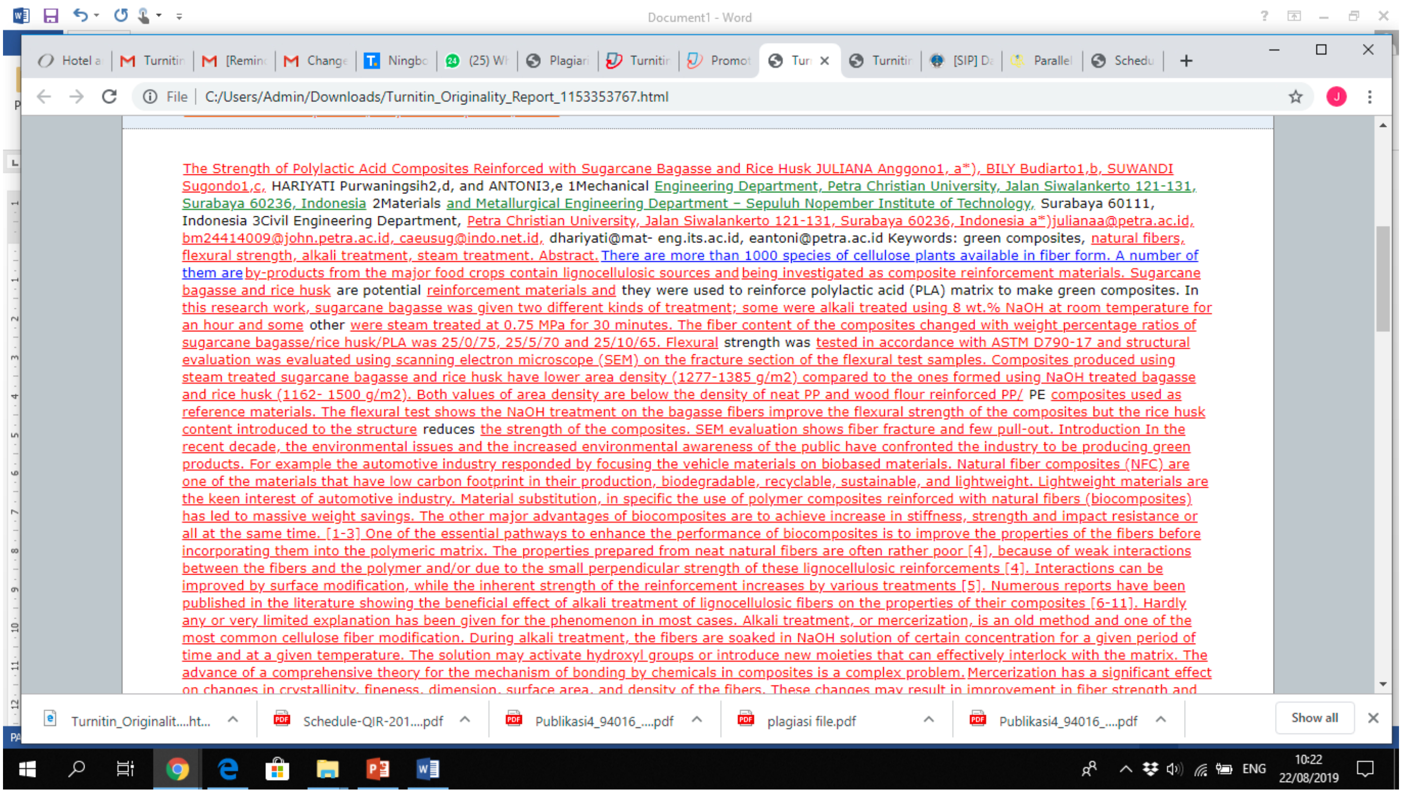
2% match (publications)
Juliana Anggono, Ágnes Elvira Farkas, András Bartos, János Móczó, Antoni, Hariyati Purwaningsih, Béla Pukánszky. "Deformation and failure of sugarcane bagasse reinforced PP", European Polymer Journal, 2019

1% match (publications)
Omar Faruk, Mohini Sain. "Preface", Elsevier BV, 2015

< 1% match (Internet from 17-May-2019)
https://aip.scitation.org/doi/pdf/10.1063/1.4968308

< 1% match (publications)
Gunti, Rajesh, A. V. Ratna Prasad, and A. V. S. S. K. S. Gupta. "Preparation and properties of successive alkali treated completely biodegradable short jute fiber reinforced PLA composites", Polymer Composites, 2015.

The Strength of Polylactic Acid Composites Reinforced with Sugarcane Bagasse and Rice Husk JULIANA Anggono1, a*), BILY Budiarto1,b, SUWANDI



The Strength of Polylactic Acid Composites Reinforced with Sugarcane Bagasse and Rice Husk JULIANA Anggono1, a*), BILY Budiarto1,b, SUWANDI Sugondo1,c, HARIYATI Purwaningsih2,d, and ANTONI3,e 1Mechanical Engineering Department, Petra Christian University, Jalan Siwalankerto 121-131, Surabaya 60236, Indonesia 2Materials and Metallurgical Engineering Department – Sepuluh Nopember Institute of Technology, Surabaya 60111, Indonesia 3Civil Engineering Department, Petra Christian University, Jalan Siwalankerto 121-131, Surabaya 60236, Indonesia a*)julianaa@petra.ac.id, bm24414009@john.petra.ac.id, caeusug@indo.net.id, dhariyati@mat- eng.its.ac.id, eantoni@petra.ac.id Keywords: green composites, natural fibers, flexural strength, alkali treatment, steam treatment. Abstract. There are more than 1000 species of cellulose plants available in fiber form. A number of them are by-products from the major food crops contain lignocellulosic sources and being investigated as composite reinforcement materials. Sugarcane bagasse and rice husk are potential reinforcement materials and they were used to reinforce polylactic acid (PLA) matrix to make green composites. In this research work, sugarcane bagasse was given two different kinds of treatment; some were alkali treated using 8 wt.% NaOH at room temperature for an hour and some other were steam treated at 0.75 MPa for 30 minutes. The fiber content of the composites changed with weight percentage ratios of sugarcane bagasse/rice husk/PLA was 25/0/75, 25/5/70 and 25/10/65. Flexural strength was tested in accordance with ASTM D790-17 and structural evaluation was evaluated using scanning electron microscope (SEM) on the fracture section of the flexural test samples. Composites produced using steam treated sugarcane bagasse and rice husk have lower area density (1277-1385 g/m2) compared to the ones formed using NaOH treated bagasse and rice husk (1162- 1500 g/m2). Both values of area density are below the density of neat PP and wood flour reinforced PP/ PE composites used as reference materials. The flexural test shows the NaOH treatment on the bagasse fibers improve the flexural strength of the composites but the rice husk content introduced to the structure reduces the strength of the composites. SEM evaluation shows fiber fracture and few pull-out. Introduction In the recent decade, the environmental issues and the increased environmental awareness of the public have confronted the industry to be producing green products. For example the automotive industry responded by focusing the vehicle materials on biobased materials. Natural fiber composites (NFC) are one of the materials that have low carbon footprint in their production, biodegradable, recyclable, sustainable, and lightweight. Lightweight materials are the keen interest of automotive industry. Material substitution, in specific the use of polymer composites reinforced with natural fibers (biocomposites) has led to massive weight savings. The other major advantages of biocomposites are to achieve increase in stiffness, strength and impact resistance or all at the same time. [1-3] One of the essential pathways to enhance the performance of biocomposites is to improve the properties of the fibers before incorporating them into the polymeric matrix. The properties prepared from neat natural fibers are often rather poor [4], because of weak interactions between the fibers and the polymer and/or due to the small perpendicular strength of these lignocellulosic reinforcements [4]. Interactions can be improved by surface modification, while the inherent strength of the reinforcement increases by various treatments [5]. Numerous reports have been published in the literature showing the beneficial effect of alkali treatment of lignocellulosic fibers on the properties of their composites [6-11]. Hardly any or very limited explanation has been given for the phenomenon in most cases. Alkali treatment, or mercerization, is an old method and one of the most common cellulose fiber modification. During alkali treatment, the fibers are soaked in NaOH solution of certain concentration for a given period of time and at a given temperature. The solution may activate hydroxyl groups or introduce new moieties that can effectively interlock with the matrix. The advance of a comprehensive theory for the mechanism of bonding by chemicals in composites is a complex problem. Mercerization has a significant effect on changes in crystallinity, fineness, dimension, surface area, and density of the fibers. These changes may result in improvement in fiber strength and

Document1 - Word

C:/Users/Admin/Downloads/Turnitin_Originality_Report_1153353767.html

thickness measured from different sugarcane bagasse and rice husk content Figure 5 Area density of composites in various composition in comparison with bagasse/PP from previous research and neat PP and wordboard composites from the industry Flexural Strength. Flexural strength is plotted against different treatments and rice husk content as shown in Fig. 6. The highest flexural strength obtained when the bagasse fibers used in the composites treated with NaOH than with steam treatment. It is clearly shown in Fig. 7 that the highest strength was attained when no rice husk addition in the bagasse/PLA mixture. The alkali treatment using 8 wt. % NaOH increase the strength of the fibers [26]. However another study reported that the steam treated rice husk reinforced phenol formaldehyde provide a better modulus of rupture and elasticity 40 Flexural Stength (MPa) 29,72 30 25,38 23,48 24,99 35 35,39 35,6 35,58 25 21,39 19,24 19,79 20 15 10 7,42 16,04 5 0 Figure 6 Flexural strength versus different treatment and rice husk content Figure 7 Correlation of flexural strength with different treatment and rice husk content Structural Characterization. Figures 8 a) to c) display the structure from the cross section of fractured area of flexural test samples. The structure shown in micrographs Fig. 8 a) and b) shows that the bagasse fiber fracture is more dominant than fiber pull-out. The lower flexural strength obtained in the composites with steam treated bagasse fibers can be the result in weakening the fiber strength due to steam treatment. Fiber pull-out was found in Figure 8c) as a result of debonding in composites with untreated bagasse fibers due to weak interfacial adhesion between fiber and PP matrix. fiber pull- out fiber fracture a) b) c) Figure 8 SEM micrographs of fracture cross section of composite samples a) NB, b) SB and c) UB Summary The results on alkali treatment on bagasse fibers produce better flexural strength of PLA composites compared to the use of steam treated fibers. The addition of steam treated rice husk lower the composite strength even further. Acknowledgements The authors thank the Ministry of Research, Technology and Higher Education of Republic of Indonesia for the research funding under grant no. 002 /SP2H/LT/ MONO/L7/2019. PT. Candi Baru Sugar Mill Factory (Indonesia) is acknowledged for providing the sugarcane bagasse fibers. The authors were grateful for the assistance of Russava Istiani with the use of SEM at Sepuluh Nopember Institute of Technology, Surabaya. References 1. L. Dányádi, K. Renner, Z. Szabo, G. Nagy, J. Móczó and B. Pukánszky, Polym. Adv. Technol. 17 (2006) 967–974. 2. L. Dányádi, K. Renner, J. Móczó and B. Pukánszky, Polym. Eng. Sci. 47(8) (2007) 1246-1255. 3. J. Anggono, Á. E. Farkas, A. Bartos, J. Móczó, Antoni, H. Purwaningsih, and B. Pukánszky, Eur. Polym. J., 112 (3) (2019) 153-160. 4. K. Renner, C. Kenyó, J. Móczó, and B. Pukánszky, Composites, Appl. Sci. Manuf. A41(11) (2010) 1653-1661. 5. R. Csizmadia, G. Faludi, K. Renner, J. Móczó, B. Pukánszky, Composites, Appl. Sci. Manuf. A53 (2013) 46-53. 6. J. Gassan, A.K. Bledzki, Compos. Sci. Technol. 59(9) (1999) 1303-1309. 7. A. Valadez-Gonzalez, J.M. Cervantes-Uc, R. Olayo, Compos B: Eng, 30 (1999) 321. 8. D. Ray, B.K. Sarkar, A.K. Rana, N.R. Bose, Bull Mater Sci, 24 (2001) 129. 9. S. Mishra, M. Misra, S.S. Tripathy, S.K. Nayak, A.K. Mohanty. Macromol Mater Eng. 286 (2001)107. 10. K. Joseph, S. Thomas, Polymer 37 (1996) 5139. 11. I. van de Weyenberg, J. Ivens, A. De Coster, B. Kino, E. Baetens, I. Vepoes, Compos Sci Technol. 63 (2003) 1241. 12. J. Anggono, et al., submitted to E3S Web of Conferences (2019). 13. L.Y. Mwaikambo, M.P. Ansell, Compos. Sci. Technol. 63 (9) (2003) 1297-1305. 14. S.S. Munawar, K. Umemura, S. Kawai, J. of Wood Science 54 (5) (2008) 369-376. 15. J. Anggono, S. Sugondo, R. Alim, H. Purwaningsih, A. Wibawa, Mater. Sci. Forum, 923 (2018) 40-46. 16. A.K. Bledzki, A.A. Mamun, Volk, J. Compos. Sci. Tech. 70 (2010) 840-846. 17. N. Petchwattana and S. Covavisaruch, J. of Bionic Eng. 10 (2013) 110-117. 18. Information on http://www.fao.org/3/x0513e/x0513e21.htm retrieved on 7 April 2019 19. Information on https://www.statista.com/statistics/255945/top-countries-of-destination-for-us- rice-exports-2011/ retrieved on 29 June 2019. 20. P.J. Van Soest, R.H. Wine, J. Assoc. Off. Anal. Chem. 50 (1967) 50-55 21. S.M. Luz, A.R. Gonçalves, and A.P. Del'Arco, Jr., Composites Part A: App. Sc. and Manf., 38 (2007) 1455-1461. 22. B.S. Ndazi, S. Karlsson, J. V. Tesha, and C. W. Nyahumwa, Compos. Part A: Appl. Sci. & Manuf. 38 (2007) 925-935. 23. Information on http://www.sugartech.co.za/density/index.php retrieved on 30 June 2019. 24. K.G. Mansaray and A. E. Ghaly, Energy Sources, 19 (9) (1997) 989- 1004. 25. G. Excoffier, B. Tousasaint, M.R. Vignon, Biotechnol.

Turnitin_Originalit....ht... Schedule-QIR-201....pdf Publikasi4_94016_....pdf plagiasi file.pdf Publikasi4_94016_....pdf Show all

10:23 22/08/2019